

Table S1. Estimated parameters for fitting the biphasic, Weibull, and linear models using experimental data HAV.

Food	RH	Temperature	Biphasic distribution			Weibull distribution			Linear distribution		
	(%)	(°C)	R ² ^a	RMSE ^b	AIC ^c	R ²	RMSE	AIC	R ²	RMSE	AIC
oyster	50	4	0.72	0.16	-9.23	0.67	0.15	-10.32	0.04	0.23	-5.93
		15	0.86	0.16	-9.47	0.79	0.17	-8.99	0.25	0.28	-3.43
		25	0.96	0.21	-6.16	0.92	0.25	-4.34	0.82	0.33	-1.67
		40	1	ND ^d	ND	1	0	ND	1	0.04	-14.88
	70	4	0.83	0.07	-19.92	0.8	0.06	-21.08	0.65	0.07	-19.61
		15	0.85	0.17	-8.2	0.76	0.15	-8.44	0.69	0.14	-9.40
		25	0.94	0.20	-6.87	0.86	0.25	-4.32	0.78	0.29	-3.39
		40	0.99	0.20	-6.49	0.98	0.22	-5.98	0.94	0.36	-0.57
paprika	50	4	0.98	0.13	-11.62	0.97	0.15	-10.36	0.91	0.23	-5.99
		15	0.99	0.18	-7.67	0.93	0.37	0.53	0.72	0.67	6.88
		25	0.99	0.30	-1.85	0.98	0.30	-2.12	0.96	0.37	-0.22
		40	1	0.03	-23.06	1	0.06	-16.27	0.98	0.3	-3.21
	70	4	0.9	0.17	-8.58	0.8	0.22	-6.02	0.42	0.33	-1.79
		15	0.98	0.07	-15.27	0.94	0.08	-13.22	0.84	0.11	-11.43
		25	0.97	0.23	-5.26	0.91	0.31	-1.80	0.69	0.52	3.79
		40	0.92	0.65	7.50	0.90	0.61	6.43	0.31	1.45	16.09

^a R² is the correlation coefficient between the predicted and observed data.

^b RMSE is the root mean square error.

^c AIC is the Akaike information criterion.

^d ND (not determined) showed when the analysis was carried out at less than 2 time point.

Table S2. Estimated parameters for fitting the biphasic, Weibull, and linear models using experimental data MS2.

Food	RH	Temperature	Biphasic distribution			Weibull distribution			Linear distribution		
	(%)	(°C)	R ² ^a	RMSE ^b	AIC ^c	R ²	RMSE	AIC	R ²	RMSE	AIC
oyster	50	4	0.91	0.06	-21.34	0.87	0.06	-21.44	0.19	0.13	-12.43
		15	0.97	0.11	-14.31	0.87	0.20	-7.25	0.55	0.32	-1.99
		25	0.91	0.23	-5.09	0.87	0.24	-4.76	0.21	0.52	3.87
		40	0.89	0.83	7.58	0.86	0.77	6.92	0.76	0.87	7.49
	70	4	0.80	0.21	-6.03	0.79	0.19	-7.69	0.79	0.17	-9.67
		15	0.99	0.10	-12.75	0.99	0.08	-13.40	0.97	0.10	-11.97
		25	0.92	0.29	-2.19	0.92	0.26	-3.80	0.9	0.21	-6.93
		40	0.72	0.66	7.52	0.71	0.58	5.73	0.3	0.80	8.96
paprika	50	4	0.95	0.1	-14.60	0.94	0.10	-15.17	0.85	0.14	-11.53
		15	0.95	0.15	-10.34	0.91	0.18	-8.37	0.89	0.18	-9.24
		25	0.94	0.19	-7.38	0.79	0.30	-1.94	0.7	0.32	-1.93
		40	1	0.13	-10.57	0.98	0.31	-2.71	0.71	0.97	6.13
	70	4	0.76	0.22	-5.45	0.73	0.71	-6.89	0.7	0.40	-8.25
		15	1	0.08	-13.96	0.98	0.12	-9.92	0.98	0.12	-10.42
		25	0.97	0.50	2.49	0.96	0.45	1.40	0.96	0.39	-0.46
		40	0.90	0.75	6.60	0.86	0.72	6.27	0.38	1.30	11.56

^a R² is the correlation coefficient between the predicted and observed data.

^b RMSE is the root mean square error.

^c AIC is the Akaike information criterion.

Table S3. Estimated parameters for fitting the biphasic, Weibull, and linear models using experimental data MNV.

Food	RH	Temperature	Biphasic distribution			Weibull distribution			Linear distribution		
	(%)	(°C)	R ² ^a	RMSE ^b	AIC ^c	R ²	RMSE	AIC	R ²	RMSE	AIC
oyster	50	4	0.93	0.12	-12.49	0.91	0.12	-13.04	0.2	0.33	-1.71
		15	1	0.01	-40.94	0.78	0.25	-4.36	0.07	0.46	2.41
		25	0.96	0.60	4.33	0.92	0.71	6.01	0.87	0.79	6.52
		40	1	ND ^d	ND	0.83	1.88	7.78	0.94	0.79	2.66
paprika	50	4	1	0	-282.35	0.9	1.06	7.26	0.66	1.61	10.19
		15	1	ND	ND	1	0	ND	0.65	1.58	6.83
		25	1	ND	ND	1	0	ND	0.8	1.3	5.65
		40	1	ND	ND	1	ND	ND	1	0	ND

^a R² is the correlation coefficient between the predicted and observed data.

^b RMSE is the root mean square error.

^c AIC is the Akaike information criterion.

^d ND (not determined) showed when the analysis was carried out at less than 2 time point.

Table S4. Summary of estimated parameters for fitting the biphasic model using virus experimental data.

Food	RH (%)	Temperature (°C)	HAV			MS2			MNV		
			f ^a	b1 ^b	b2 ^c	f	b1	b2	f	b1	b2
Oyster	50	4	-0.57	-2.98	0.01	-0.46	-2.07	0.01	0.74	29.32	0.11
		15	-0.67	-67.35	0.02	0.05	-4584.47	1.08	-0.99	-1.19	-0.01
		25	0.76	3.80	0.29	-0.91	-2.89	0.00	2.00	0	-0.89
		40	0.02	2.24	3.82	0.05	0.76	30.05	157.14	40.45	207.55
	70	4	-0.28	-1.06	0.02	-0.52	-0.45	0.03	- ^d	-	-
		15	-0.35	-167.27	0.07	-2.20	-0.30	-0.07	-	-	-
		25	1.76	0.02	-30.95	-0.33	48.40	0.38	-	-	-
		40	1.10	0.50	0.33	0.93	33.10	0.24	-	-	-
Pepper	50	4	0.77	1.61	0.28	1.77	0.01	-0.58	0	0.08	4.63
		15	1.99	0.00	-4.47	0.54	0.24	36.79	0	1.27	41.98
		25	0.80	50.08	0.78	1.74	0.02	-30.43	0	-416.17	47.33
		40	1.00	9.94	2.86	0.01	0.92	31.43	0	-1586.88	61.11
	70	4	-0.84	-1.38	0.00	0.48	0.91	0.11	-	-	-
		15	0.64	0.22	25.32	0.47	37.98	0.61	-	-	-
		25	-0.97	-1.54	0	0.67	41.81	1.01	-	-	-
		40	1.00	31.97	0.42	0.01	0.49	36.17	-	-	-

^a f is the more resistant fraction of the population.

^b b1 is the specific death rate corresponding to the first fraction.

^c b2 is the specific death rate corresponding to the second fraction.

^d MNV was observed under 50% RH only.